Amendment Report

Application for Works Approval Amendment

Part V Division 3 of the Environmental Protection Act 1986

Works Approval

Number

W6578/2021/1

Works Approval

Holder

FQM Australia Nickel Pty Ltd

ACN 135 761 465

File Number DER2021/000358

Premises Ravensthorpe Nickel Operations

Legal description -

Part of Mining Tenements M74/175, M74/115 and M74/116

JERDACUTTUP WA 6346

As defined by the Premises maps attached to the revised

works approval

Date of Report 23 May 2022

Proposed Decision Revised works approval granted

Tanya Fyfe

A/SENIOR ENVIRONMENTAL OFFICER, RESOURCE INDUSTRIES REGULATORY SERVICES

an officer delegated under section 20 of the Environmental Protection Act 1986 (WA)

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1. Decision summary

Works Approval W6578/2021/1 is held by FQM Australia Nickel Pty Ltd (Works Approval Holder) for the Ravensthorpe Nickel Operations (the Premises), located within mining tenements M74/175, M74/115 and M74/116, at Jerdacuttup, Western Australia 6346.

This Amendment Report documents the assessment of potential risks to the environment and public health from proposed changes to the emissions and discharges during the construction and operation of the Premises. As a result of this assessment, Revised Works Approval W6578/2021/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this Amendment Report, the department has considered and given due regard to its Regulatory Framework and relevant policy documents which are available at https://dwer.wa.gov.au/regulatory-documents

2.2 Application summary

On 18 January 2022, the Works Approval Holder submitted an application to the department to amend works approval W6578/2021/1 under section 59 and 59B of the *Environmental Protection Act 1986* (EP Act). The amendment being sought involved an extension to timeframes for the construction of groundwater monitoring wells and seepage recovery bores, under condition 2 and 4 of the works approval, respectively. The current timeframe for the works is 31 May 2022, while the amended timeframe would be 31 December 2022 (i.e. seven month extension). The proposed locations for the groundwater monitoring wells and seepage recovery bores are provided in Figure 1.

The seepage recovery bores are intended to be constructed south of Tailing Storage Facility 2 (TSF2), where historical groundwater monitoring has shown an increasing trend in standing water level (SWL).

The construction of additional groundwater monitoring wells is intended to improve seepage monitoring coverage around TSF2 and assess the effectiveness of the proposed seepage recovery bores.

It is anticipated that continued tailings deposition at TSF2 would necessitate the time-limited operation of the combined Stage 2 and Stage 3 embankment raise before the construction of the bores can be completed.

No changes to the aspects of the existing works approval relating to Category 5 throughput capacity or infrastructure have been requested by the Works Approval Holder.

2.2.1 Additional changes requested during assessment

In corresponding with the Works Approval Holder during the assessment of this amendment, several administrative matters were also brought to the department's attention, including:

- In Table 1, the Works Approval Holder noted that the *Design and construction requirements*' for TSF2 (Combined Stage 2 and Stage 3) embankment raise specified the raise to be from 120.7 mRL to 126.7 mRL. The Works Approval Holder noted that while the requirement was technically correct, the embankment height had already been constructed to 123.7 mRL and authorised for operations under licence L8008/2004/3. The combined Stage 2 and 3 raise would only involve a three-metre raise.
- In Table 4, evaporation ponds 9, 13 and 16 were intended to be repaired first (i.e. by 31

March 2022), followed by evaporation pond 12 (i.e. by 31 December 2022). However, the Works Approval Holder had decided to alter the sequence of evaporation pond repairs, such that evaporation pond 12 had already been repaired while evaporation pond 9 was still undergoing repairs, at the time of granting of this amendment. As the evaporation ponds are all constructed with similar designs, a change in the sequence of repair should not materially impact the risks that were assessed initially.

In considering these matters raised by the Works Approval Holder, the Delegated Officer has decided to amend the works approval to also reflect these changes.

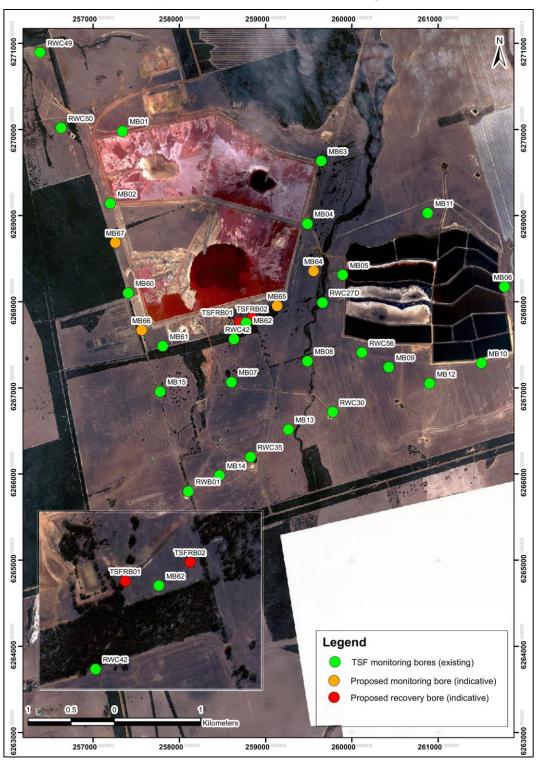


Figure 1: Location for proposed TSF monitoring wells and recovery bores

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020b).

To establish a Risk Event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises operation which have been considered in this Amendment Report are detailed in Table 1 below.

Table 1 also details the proposed control measures the Works Approval Holder has proposed to assist in controlling these emissions, where necessary.

Table 1: Works Approval Holder controls

Emission	Sources	Potential pathways	Proposed controls
Seepage of tailings leachate	Deposition of tailings into TSF2 (Stage 3)	Seepage of leachate through base and embankments of TSF2 into soil and groundwater	The controls for managing the risks associated with seepage following construction of TSF2 (Stage 3) embankment raise has already been assessed and outlined in the Decision Report for works approval W6578/2021/1. As part of this amendment, the Works Approval Holder proposed no additional controls. Some controls are deferred by 7 months in this amendment.

3.1.2 Receptors

In accordance with the *Guideline: Risk assessments* (DWER 2020b), the Delegated Officer has excluded employees, visitors and contractors of the Works Approval Holder's from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 2 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020a)).

Table 2: Sensitive human and environmental receptors and distance from prescribed activity

Human receptors	Distance from prescribed activity	
Rural residential premises	Residential receptors are located: • 3.6 km southwest of the western border of the TSF2 footprint area; • 3.6 km south of the southern border of the TSF2 footprint area; and • 5.9 km southeast of the southern border of the TSF2 footprint area.	
Environmental receptors	Distance from prescribed activity	
Remnant native vegetation	Located to the east, south and west of the TSF2 footprint area.	
Conservation significant areas	 Reserve R43060 vested with the Conservation Commission of Western Australia for the purpose of 'Conservation of flora and fauna' is located approximately 1.6 km southwest of the TSF footprint area border; and Reserve R49742 vested with the Conservation Commission of Western Australia for the purpose of a 'Conservation Park' is located approximately 3.1 km northwest of the border of the TSF2 footprint area. 	
Threatened ecological community (TEC)	Remnant native vegetation located to the east, south and west of the TSF2 footprint area has been mapped as 'Proteaceae dominanted kwongkan shrublands of the southeast coastal floristic province of Western Australia' TEC. The closest occurrence of the TEC is located approximately 60 m west of the TSF2 area. This ecological community is listed as Priority 3 (by DBCA) and threatened (under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999).	
Conservation significant flora	One threatened flora species and three priority listed flora species occur within one kilometre of the TSF2 footprint area, including: • Beyeria cockertonii (Threatened) – 610 m and 640 m from the western border of the TSF2 area; • Goodenia phillipsiae (Priority 4) – 916 m and 920 m from the western border of the TSF2 area; • Micromyrtus navicularis (Priority 3) – 700 m from the western border of the TSF2 area; and • Grevillea punctata (Priority 3) – 615 m from the western border of the TSF2 area. An additional six species of conservation significance were recorded within the larger project area during previous flora surveys, including: • Acrotriche orbicularis (Threatened); • Beyeria cocketoni (Threatened); • Conostylis lepidospermoides (Endangered); • Eucalyptus purpurata (Threatened);	

	Hibbertia abyssus (Critically Endangered); and
	Kunzea similis subsp. Mediterranea (Threatened).
Surface water	The closest surface water lines to the TSF2 footprint area are:
	Burlabup Creek – 1.1 km southeast of the southern border of the TSF2 area;
	 Gnamma Creek – 2.3 km east of the eastern border of the TSF2 area; and
	Bandalup Creek – 6 km northwest of the border of the TSF2 area.
	Both Burlabup Creek and Bandalup Creek discharge into the Jerdacuttup River, located approximately 8.2 km east of the TSF2 area.
	TSF2 is located within the Burlabup Creek's catchment area. The Gnamma Creek drains the eastern side of the catchment, joining Barlabup Creek south of the Jerdacuttup North Road.
Groundwater	The groundwater table is typically at elevations between 90 to 120 m AHD and flows to the southwest.
	Groundwater monitoring results provided by the Works Approval Holder indicated that SWLs at TSF2 ranged from 6.30 m below ground level (mbgl) to 20.64 mbgl in July 2021 (FQM 2021), with significant increases in groundwater levels in the last four years, exceeding predictions from seepage modelling.
Groundwater beneath the TSF is mostly saline to hypersaline, a groundwater does occur across the site. Groundwater salinity (n total dissolved solids) at the TSF area exceeded 10,000 mg/L in monitoring bores (Golder 2021).	
	Historical land clearing for agriculture has resulted in elevated regional groundwater salinity, which also contributed to increased salinity in surrounding surface water systems. Land use south of TSF2 is agricultural.
	Due to high salinity, groundwater is generally not suited for livestock or irrigation purposes.
Cultural receptors	Distance from prescribed activity
Aboriginal heritage places	The closest Aboriginal Heritage site to the TSF2 footprint area is the Registered Aboriginal Site known as 'Gnamma Hole' (ID 18950).
	Gnamma holes are natural cavities commonly found in hard rock and acts as a main source of water for Aboriginal communities.

3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020b) for those emission sources which are proposed to change and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are incomplete they have not been considered further in the risk assessment.

Where the Works Approval Holder has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the Works Approval Holder's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the Works Approval Holder's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 3.

The Revised Works Approval W6578/2021/1 that accompanies this Amendment Report authorises construction and time-limited operations. The conditions in the Revised Works Approval have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the Premises i.e. tailings deposition to TSF2 (Stage 3). A risk assessment for the operational phase has been included in this Amendment Report, however licence conditions will not be finalised until the department assesses the licence application.

Table 3: Risk assessment of potential emissions and discharges from the Premises during operation

Risk Event	Risk Event							
Source/Activities	Potential emission	Potential pathways and impact	Receptors	Works Approval Holder's controls	C = consequence L = likelihood	Approval Holder's controls sufficient?	Conditions ² of works approval	Justification for additional regulatory controls
Operation (including	ng time-limite	d-operations operations)						
Tailing deposition to TSF2 (Combined Stage 2 and 3 embankment raise)	Tailings leachate	Pathway: Vertical and lateral seepage from base and embankments of TSF2 into soil and groundwater. Impacts: Groundwater mounding and surface expression of groundwater, causing vegetation stress or deaths due to increased salinity within root zones of vegetation. Contamination of soil and groundwater, and migration of contaminants.	Rural groundwater users; Remnant native vegetation, including conservation significant areas, TECs and conservation flora species Surface water; Groundwater aquifer; and Aboriginal heritage places (i.e. gnamma holes)	None proposed for this amendment. Proposed controls are included in W6578/2021/1 Decision Report.	C = Moderate L = Possible Medium Risk Refer to Section 3.3	No	Condition 1 Condition 2 Condition 4 Condition 9 requires the submission of Environmental Compliance Report for all infrastructure in Table 1 of works approval W6578/2021/1 and for at least three evaporation ponds listed in Table 4 prior to commencing time-limited operation for TSF2 embankment raise. Condition 11	The Delegated Officer considers amendments to existing conditions to be necessary, to ensure that other seepage management infrastructure has been constructed and is operational before tailings deposition progress to the combined Stage 2 and 3 embankments. The Deleted Officer considers this infrastructure to be adequate for managing seepage for a limited period, and of critical importance due to the delay in seepage recovery and monitoring bore construction.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the Guideline: Risk assessments (DWER 2020b).

Note 2: Proposed Works Approval Holder's controls are depicted by standard text. Bold and underline text depicts additional regulatory controls imposed by department.

3.3 Detailed risk assessment for time-limited operation of TSF2 Combined Stage 2 and Stage 3 embankment without bore infrastructure

3.3.1 Proposed activity

Through this amendment, the Works Approval Holder intends to extend the timeframe for the construction of groundwater monitoring bores and seepage recovery bores required in works approval W6345/2021/1 due to logistical challenges. These bore infrastructure were critical controls to be implemented as part of the works approval to manage the seepage from the increased tailings deposition into TSF2 once the combined Stage 2 and Stage 3 embankments were raised to 126.7 mRL.

Based on correspondence with the Works Approval Holder, the commencement of time-limited operation for the combined Stage 2 and Stage 3 embankments was estimated to be around August 2022. Given the proposed extension for bore construction, TSF2 would undergo time-limited operation without the necessary bore infrastructure for at least three months, up to a maximum of seven months, based on the requested extension. It should be noted that, based on the initial risk assessment, the construction of the groundwater monitoring and seepage recovery bores were not a prerequisite for the commencement of time-limited operation, and as such, were conditioned separately from the embankment raise and other infrastructure.

Groundwater mounding as a result of seepage from TSF2 has been observed in the existing groundwater bore network. The extent of mounding is most severe to the south of TSF2, dissipating with distance from the TSF (Figure 2). Based on monitoring data provided by the Works Approval Holder up to July 2021, SWL at the TSF2 southern embankment is becoming increasingly shallower, with the SWL of MB62 at 6.96 mbTOC (metres below top of casing) in July 2021. While there is no limit for SWL specified in licence L8008/2004/3, the rising trend in SWL represents an increasing risk towards nearby sensitive receptors.

3.3.2 Proposed controls

To monitor and manage additional seepage from the operation of TSF2 combined Stage 2 and Stage 3 embankment, several measures were proposed and subsequently conditioned in works approval W6578/2021/1, including:

- · Seepage collection system;
- Vibrating wire piezometers (VWP)
- Groundwater monitoring bores;
- Seepage recovery bores; and
- Lined evaporation ponds (existing, to be repaired).

Specifically, the seepage collection system will be constructed along the southern embankment of TSF2, where groundwater mounding was most severe. The location of the seepage collection drain would be close to the seepage recovery bores and will likely be able to capture some degree of seepage prior to the construction of the bores.

Based on correspondence with the Works Approval Holder, all infrastructure conditioned in the works approval would be constructed prior to commencing time-limited operation of the TSF2 combined Stage 2 and Stage 3 embankment, with the exception of groundwater monitoring and seepage recovery bores, as discussed earlier.

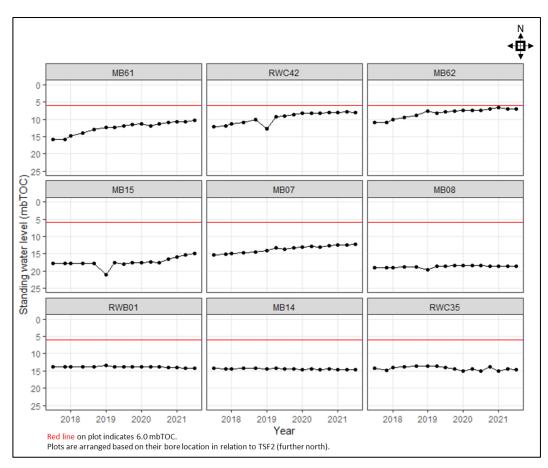


Figure 2: Standing water level for groundwater monitoring bores south of TSF2.

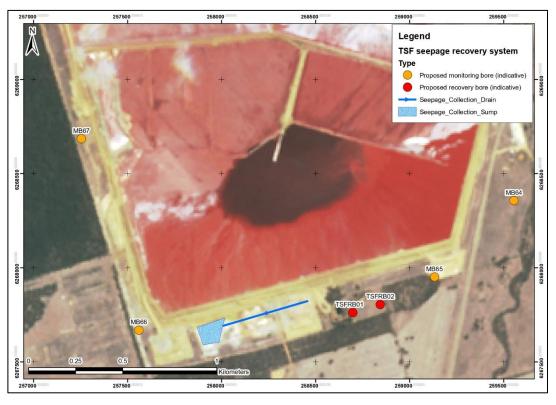


Figure 3: Proposed location of seepage collection drain and sump, in relation to proposed recovery bores

3.3.3 Risk assessment

Given the controls in place and the standing water level trends, the requested seven-month extension for bore construction is unlikely to significantly increase groundwater mounding due to seepage, and hence the risk of impact to receptors. The delay in constructing the required groundwater monitoring bores would result in reduced data for monitoring groundwater mounding but would not represent any direct impact to the environment. The expected incremental increase in seepage due to continued tailings deposition into TSF2 over an additional seven months is likely to be adequately managed by the controls in Section 3.3.2, in spite of the deferred construction of the seepage recovery bores.

As such, the risk rating for this source-pathway-receptor linkage is not altered. The consequence for this risk event is **moderate**, and the likelihood for this risk event is **possible**, resulting in an overall risk rating of **medium risk**.

To ensure that all necessary infrastructure has been adequately installed prior to time-limited operation of the TSF2 combined Stage 2 and Stage 3 embankment, the Delegated Officer has amended condition 9 to require the submission of an Environmental Compliance Report for the relevant infrastructure prior to commencing time-limited operation.

4. Consultation

Table 4 provides a summary of the consultation undertaken by the department. As the amendment is primarily administrative in nature, the relevant Local Government Authority and the Department of Mines, Industry Regulation and Safety were not consulted.

Table 4: Consultation

Consultation method	Comments received	Department response
Works Approval Holder was provided with draft amendment on 13 May 2022	 The Works Approval Holder identified several erroneous references to condition numbers throughout the draft works approval. Requested figure provided 	 The department noted that this was a typological error during the drafting of this amendment and has amended the works approval accordingly. Inserted

5. Conclusion

Based on the assessment in this Amendment Report, the Delegated Officer has determined that a Revised Works Approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

5.1 Summary of amendments

Table 5 provides a summary of the proposed amendments and will act as record of implemented changes. All proposed changes have been incorporated into the Revised Works Approval as part of the amendment process.

Table 5: Summary of works approval amendments

Condition no. Proposed amendments	
-	Updated the Works approval history to include this amendment.
Condition 1	Updated Table 1 to amend embankment raise at TSF2 from 120.7 mRL to 123.7 mRL.

Condition no.	Proposed amendments
Condition 2	Updated Table 2 to extend timeframe from 31 May 2022 to 31 December 2022.
Condition 4 Updated Table 3 to extend timeframe from 31 May 2022 to 31 December 2022.	
Condition 6	Updated Table 4 to amend evaporation pond IDs.
Condition 9 Updated condition 9 to require environmental compliance reports for all infrastrution Table 1 and at least three evaporation ponds in Table 4 to be submitted before commencing time-limited operation for TSF2 (combined Stage 2 and Stage 3) embankment.	
Condition 10(b)	Administrative change to current standard condition wording, to clarify that limited time operations ends when a licence is issued for that activity.
Condition 11	Updated Table 2 to specify operational requirements for evaporation ponds 9, 12, 13 and 16.

References

- 1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
- 2. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental Siting*, Perth, Western Australia.
- 3. DWER 2020b, Guideline: Risk Assessments, Perth, Western Australia.
- 4. FQM Australia Nickel Pty Ltd (FQM) 2021, updated standing water levels data from 2017 to 2021 provided by the applicant for W6578/2021/1, dated 15 September 2021. DWER Reference A2046602.
- 5. Golder Associates Pty Ltd (Golder) 2021, 2019-2020 Annual Groundwater Monitoring and Sampling Review for Tailings and Processing Areas Ravensthorpe Nickel Operations. Works Approval Application Ravensthorpe Nickel Operations Tailings Storage Facility 2 Stage 3, dated June 2020. DWER Reference DWERDT465229.

Appendix 1: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)						
Application type						
Works approval						
		Relevant works approval number:		None		
		Has the works approval been complied with?		Yes □ No □		
Licence		works approval den	Has time limited operations under the works approval demonstrated acceptable operations?		No □ N/A □	
		Environmental Com Critical Containmen Report submitted?		Yes □	No □	
		Date Report receive	ed:			
Renewal		Current licence number:				
Amendment to works approval	\boxtimes	Current works approval number:	W6578/2021/1			
Amonda anticlicano		Current licence number:				
Amendment to licence		Relevant works approval number:		N/A		
Registration		Current works approval number:		None		
Date application received		18 January 2022				
Applicant and Premises details						
Applicant name/s (full legal name/s)		FQM Australia Nickel Pty Ltd				
Premises name		Ravensthorpe Nickel Operations				
Premises location		Mining tenements M74/115, M74/116 and M74/175				
Local Government Authority		Shire of Ravensthorpe				
Application documents						
HPCM file reference number:	DER2021/000358~1					
Key application documents (additional to application form):		Cover letter				
Scope of application/assessment						
		Works approval amendment				
Summary of proposed activities or changes to existing operations.		Amendment to extend timeframe for construction of groundwater monitoring wells (Condition 2, Table 2) and seepage recovery bores (Condition 4, Table 3).				

Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
Category 5: Processing or beneficiation of metallic or non-metallic ore	13,900,000 tonnes per annual period.	No change.

Legislative context and other approvals

Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes □ No ⊠	Proposal is not significant.
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes ⊠ No □	Ministerial statement No: MS633 EPA Report No: EPA report 1199 and 1426
Has the proposal been referred and/or assessed under the EPBC Act?	Yes ⊠ No □	Reference No: EPBC 2001/172
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes □ No ⊠	Not necessary as amendment is minor.
Has the applicant obtained all relevant planning approvals?	Yes □ No □ N/A ⊠	Premises is not on freehold land; managed under Mining Act 1978.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes □ No ⊠	No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes □ No ⊠	No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes □ No □ N/A ⊠	Licence/permit was not provided. Not applicable to this amendment.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes □ No ⊠	The premises is not located within a designated area. However, the premises' northern boundary abuts the Kondinin-Ravensthorpe Groundwater Area.
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes □ No ⊠	N/A

Is the Premises subject to any other Acts or subsidiary regulations?	Yes ⊠ No □	Mining Act 1978
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes □ No ⊠	N/A
Is the Premises subject to any EPP requirements?	Yes □ No ⊠	N/A
Is the Premises a known or suspected contaminated site under the Contaminated Sites Act 2003?	Yes □ No ⊠	N/A